PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2000-332750**
(43)Date of publication of application : **30.11.2000**

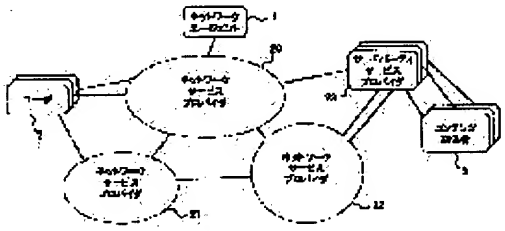
(51)Int.Cl. H04L 12/14
G06F 13/00
G06F 15/16
H04L 12/56
H04M 15/00

(21)Application number : **11-142806**
(22)Date of filing : **24.05.1999**

(71)Applicant : **FUJITSU LTD**
(72)Inventor : **NAKAMURA MITSUHIRO**

(54) CENTRALIZED CHARGING AND SETTLING SYSTEM BY NETWORK ACCESS AGENT

(57)Abstract:
PROBLEM TO BE SOLVED: To select the cheapest route from among routes which meet the service quality conditions of a communication request by registering the service quantity conditions and prices that respective domains of multiple network service providers provide in an agent which is connected to one of the network service providers.
SOLUTION: Network service providers 20 to 22 in networks connect among the networks. Furthermore, a third-party service provider 23 sends contents from a contents provider 3 to a requesting user 2. Here, a network (access) agent 1 is connected to the provider 20. The respective providers 20 to 22 register the service quality conditions and prices, that their domains provide in the agent 1. The agent 1 selects a route having lowest total cost, when the user 2 sends a request for service quality conditions.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Centralized charging and the settlement-of-accounts system by the network access agent who has two or more network service providers stationed in each domain, and the service provider connected to a contents provider, has the network access agent connected to either of these two or more network service providers in the network which provides a user with these contents by demand, and is characterized by performing resource management between domains, routing, and accounting liquidation by this network access agent.
[Claim 2] In claim 1 said network access agent The routing section which performs said network service provider, a service provider, and user registration, The connection management section which performs registration of the service (quality QoS) demand from a user, and the resource reservation demand to this network service provider corresponding to this quality-of-service (QoS) demand, Centralized charging and the settlement-of-accounts system by the network access agent characterized by having the accounting liquidation section which has the table which performs accounting liquidation, and being constituted based on the communication link initiation from this connection management section, and the notice of termination.
[Claim 3] In the network which has two or more network service providers stationed in each domain, and the service provider connected to a contents provider, and provides a user with these contents by demand He is the network access agent connected to either of these two or more network service providers. The quality-of-service (QoS) conditions and price which each domain of two or more of said network service providers offers are registered. The cheap root is chosen. the inside of the root which fulfills the quality-of-service (QoS) conditions of a communication link demand receptionist and this communication link demand from this user -- ** -- The network service provider which goes via the this selected root is notified. The network access agent in centralized charging and the settlement-of-accounts system characterized by distributing settlement of accounts to the network service provider which used settlement of accounts of this user to activation of this communication link demand on the occasion of activation of this communication link demand.
[Claim 4] The network access agent in centralized charging and the settlement-of-accounts system which supervises whether the specified quality of service (QoS) is further offered in claim 3, and is characterized by making the network provider who analyzes the domain used as the cause and manages the domain of relevance by the difference of an income fill up when the this offered quality of service (QoS) is less than assignment.
[Claim 5] The network access agent in centralized charging and the settlement-of-accounts system characterized by performing selection of said root using a Nucl eus&Spoke (nucleus and arrow) model in claim 2.
[Claim 6] A monitor is [Claim 7] characterized by pinpointing the domain which measures a quality of service (QoS) in claim 4 at the outlet of the domain which goes via a quality of service (QoS) when it observes, respectively whether said specified quality of service (QoS) is offered and there is a difference among said selected service providers and users, and has become a cause. In the network which has two or more network service providers stationed in each domain, and the service provider connected to a contents provider, and provides a user with these contents by demand It has the network access agent connected to either of these two or more network service providers. Two or more network providers' each registers into this network access agent the quality-of-service (QoS) conditions and price which a self-domain offers. This network access agent From a user to a communication link demand receptionist The cheap root is chosen. the inside of the root which fulfills the quality-of-service (QoS) conditions of this communication link demand -- ** -- notify the provider who goes via the this selected root, and the settlement of accounts to activation of this communication link demand This user pays and performs a tariff to this network access agent. Further this network access agent Centralized charging and the settlement-of-accounts approach by the network access agent characterized by distributing settlement of accounts to the network provider who used it on the occasion of activation of this communication link demand.
[Claim 8] They are centralized charging and the settlement-of-accounts approach by the network access agent who said network access agent supervises whether the quality of service (QoS) specified further is offered in claim 7, and is characterized by making the network service provider which analyzes the domain used as the cause and manages the domain of relevance by the difference of an income fill up when the this offered quality of service (QoS) is less than assignment.
[Claim 9] a monitor be centralized charging and the settlement of accounts approach by the network access agent characterize by pinpoint the domain which measure a quality of service (QoS) in claim 8 at the outlet of the domain which go via a quality of service (QoS) when it observe , respectively whether said specified quality of service (QoS) be offer and there be a difference among said selected service providers and users , and have become a cause .

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to centralized charging and the settlement-of-accounts system by the network access agent.
[0002]
[Description of the Prior Art] Only offer of the service in which the service provision in the existing Internet does not have the dependability characterized by the best effort type until now is performed.
[0003] On the other hand, research on the implementation method of current QoS (Quality of Service: quality of service) guarantee mold service is advanced. However, examination is seldom progressing about accounting and the clearing system in QoS guarantee mold service.
[0004] It is necessary to respond to a report of a user beforehand, and to reserve and secure a network resource with QoS guarantee mold service. For this reason, the charging system based on the stricter amount used must be applied. If the charging system based on the fixed amount connection or time amount like the existing Internet is applied to QoS guarantee mold service, a user is expected that network use effectiveness gets worse remarkably in order to reserve a lot of possible resources.
[0005] On the other hand, since the incentive which performs capacity strengthening investment is born to the part where it counts upon a lot of use, or a congestion part with the view by the side of a network provider, or the charging system based on the amount used, a charging system based on the amount used is desired even in the field of development and the utilization ratio of the whole network.
[0006]
[Problem(s) to be Solved by the Invention] However, when the network is employed by the single entrepreneur, it is not so difficult, but when it consists of networks which a countless network provider manages like the Internet, the following technical problems occur.
[0007] It is implementation of the approach of determining the root of low cost most among the roots which fill QoS which a user demands [1st]. Especially, scaler kinky thread TIHE needs to be considered. That is, since the network is very large-scale, it is necessary to consider count effectiveness. [0008] It is establishment of the settlement-of-accounts approach at the time of communicating via the network (it being called a domain below) with which two or more network providers provide the 2nd. Payment [each user / many network providers (in it, the provider who has not done the subscription contract is also contained directly)]. Moreover, each network provider needs to receive payment from many users. For this reason, huge settlement-of-accounts office work etc. is needed for authentication.
[0009] Furthermore, when communicating through two or more domains, it is required to establish failure detection when it becomes impossible to offer QoS as which the failure was required by generating in a certain domain, re-routing, and settlement-of-accounts processing.
[0010] Therefore, the purpose of this invention is in service of the type which guarantees QoS to offer centralized charging and the settlement-of-accounts system which fills each above-mentioned demand.
[0011]
[Means for Solving the Problem] The above-mentioned technical problem is solved by preparing a network access agent (it being suitably written as Nagent as occasion demands below) by this invention.
[0012] As a desirable gestalt, it has two or more network service providers stationed in each domain, and the service provider connected to a contents provider, and has the network access agent connected to either of said two or more network service providers in the network which provides a user with said contents by demand.
[0013] and the inside of the root which a network access agent registers the quality-of-service (QoS) conditions and price which each domain of two or more of said network service providers offers, and fulfills the quality-of-service (QoS) conditions of a communication link demand receptionist and this communication link demand from said user -- ** -- the cheap root is chosen. [0014] Furthermore, the network service provider which goes via the selected root is notified, and it is characterized by distributing settlement of accounts to the network service provider which used settlement of accounts of the user to activation of said communication link demand on the occasion of activation of a communication link demand. [0015] Furthermore, a desirable gestalt supervises whether the quality of service (QoS) specified further is offered, and when the quality of service (QoS) to offer is less than assignment, it analyzes the domain used as the cause. And it is characterized by making the network provider who manages the domain of relevance by the difference of an income fill up. [0016] Moreover, a desirable gestalt is characterized by performing selection of said root using a Nucl eus&Spoke (nucleus and arrow) model.
[0017] A quality of service (QoS) is measured at the outlet of the domain via which it goes when a monitor observes a quality of service (QoS), respectively and has [whether said specified quality of service (QoS) is offered as a desirable gestalt further again, and] a difference among said selected service providers and users, and it is characterized by pinpointing the domain used as a cause. [0018] The further description of this invention becomes clear from the gestalt of implementation of invention explained with reference to the following drawings.

[0019]
[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing below. In addition, in drawing, a reference number or a reference designator identically same to a like is attached and explained.
[0020] Drawing 1 is drawing showing the network configuration and the business model of the system which realizes centralized charging and the settlement-of-accounts approach by the network access agent (Nagent) who applies this invention.
[0021] Two or more network providers 20-22 exist in a network, and connection between networks is made. Furthermore, a service provider 23 exists and the contents from the contents provider 3 are sent out towards the user 2 with a demand.
[0022] As a description of this invention, the network access agent (Nagent) 1 linked to one of network providers is installed. It connects with the network provider 20 in drawing 1 .
[0023] This Nagent1 has the function to perform the resource management between domains, routing, accounting and settlement of accounts, fault management, etc. This function is realized by the software configuration of Nagent1 as shown in drawing 2 .
[0024] Software constitutes each function part of the routing section 10, the connection management section 11, and the accounting settlement-of-accounts section 12. The routing section 10 carries out generation registration of the user registration table, network provider registration table, and service provider registration table which are explained later.
[0025] The connection management section 11 performs the resource reservation demand and disconnection to said network service provider corresponding to a receptionist and this quality service (QoS) demand of the quality service (QoS) demand from a user.
[0026] The accounting liquidation section 12 has the table which performs accounting liquidation based on the communication link initiation from the connection management section 11, and the notice of termination.
[0027] Furthermore, although the detail of actuation of each function part is explained later, it explains the outline of this invention by drawing 1 here for easy-izing of an understanding.
[0028] In drawing 1, each network providers 20-22 register into Nagent1 the QoS conditions and price which a self-domain offers.
[0029] the inside of the root which fulfills the QoS conditions of the communication link demand which received Nagent1 from the user 2 -- ** -- the cheap root is chosen and the going provider is notified of it.
[0030] About settlement of accounts, a user 2 pays a tariff to Nagent1. And settlement of accounts is distributed to the provider who used it by Nagent1.
[0031] Nagent1 supervises whether specified QoS is offered further. When QoS to offer is less than assignment, the domain used as the cause is analyzed. And the provider who manages the domain of relevance by the difference of an income is made to fill up.
[0032] The concrete example of the centralized charging and the settlement-of-accounts approach by the network access agent (Nagent) 1 according to above-mentioned this invention is explained according to the Nagent-provider-user-user signaling sequence flow of drawing 3 .
[0033] Moreover, the contents of the signal sent and received according to the sequence flow of drawing 3 are shown in drawing 4 thru/or drawing 15 . The sequence of drawing 3 is explained referring to these drawings suitably.
[0034] A QoS condition registration signal is sent to the network access agent (Nagent) 1 in advance from the network providers 20-22 (step S1). It seems that the contents of this QoS condition registration signal are shown in drawing 4 . Namely, a network provider's port ID or (Port) Target PortID or target BypassID is sent as a bypass (Bypass) ID.
[0035] Furthermore, when it has connected with the port as an initial entry when an object is a port (Port), and also a provider's Port (Port) ID and object are a bypass (Bypass), the port (Port) ID of the self-domain which the bypass has connected is sent. [0036] Moreover, it is QoS between the ports connected when QoS (a price, a band, the maximum delay, etc.) between Nucleus(es) (nucleus) later explained to be the port when an object is a port (Port) as QoS conditions, and an object are bypasses. It is sent.
[0037] Thereby, the network access agent (Nagent) 1 registers the following network provider registration table in the routing section 10 (refer to drawing 2).
[0038]
 [Table 1]

ネットワークプロバイダ登録テーブル

Network Provder ID	Port ID	QoS条件	支払い条件
OCN	東京01	6M/秒 20m秒 ¥300/分	銀行振込
		1.5M/秒 20m秒 ¥100/分	XX銀行
	横浜01	6M/秒 18m秒 ¥360/分	

[0039] Similarly, a service condition registration signal is sent to the network access agent (Nagent) 1 in advance from a service provider 23 (step S2). It seems that the contents of this service condition registration signal are shown in drawing 5 . That is, ID of a self-server is sent as a server (server) ID of a service provider.
[0040] Furthermore, a provider's PortID which a self-server connects is sent as a port (port) ID. Moreover, applicable service recommendation or the QoS conditions to permit are sent as QoS conditions.
[0041] This registers the following service provider registration table by the network access agent's (Nagent) 1 routing section 10.
[0042]
[Table 2]

サービスプロバイダ登録テーブル

サーバID	接続するプロバイダのPort ID	推奨するQoS条件
nakara001	muOCN 東京 07	推奨 6.3M/秒 最低1.5M/秒

[0043] Moreover, when there is a QoS demand from a user (step S3), user registration is beforehand performed to the network access agent (Nagent) 1. The following user registration table is created by the routing section 10 based on the information from a user 2 sent through the network access agent's (Nagent) 1 connection management section 11 as this user registration.
[0044]
[Table 3]

ユーザ登録テーブル

ユーザID	接続するプロバイダのPort ID	ユーザの端末または加入者線で許容されるQoS条件(帯域等)	支払い条件
nakamura 001	Nifty 川崎 01	1. 5M/秒	VISA0123456

[0045] Thus, a user registration table, a network provider registration table, and a service provider registration table are registered into Nagent1.
[0046] In these conditions, the demand of QoS is sent to Nagent1 from a user 2 (step S3). It seems that the contents of the demand of QoS sent by the user 2 are shown in drawing 6 here. [0047] Namely, the user ID assigned at the time of Nagent1 and a contract (However, the user who has not contracted with Nagent1 is omitted) A provider's PortID which self connects (however, abbreviated to specifying user ID), QoS permitted with a user's terminal or subscriber line The subscriber conditions of conditions (band etc.) (abbreviated to specifying user ID), ID of the server which wants to communicate, and QoS which applicable service recommends or permits They are conditions (QoS assignment of Guarantee (indispensable) and Best Effort (if possible) is possible for every item). [0048] The network access agent (Nagent) 1 will choose the root, if the demand of QoS is sent from a user 2. The selection algorithm of this root is explained by Nucleus(nucleus) &Spoke (arrow) model routing shown in drawing 16 .
[0049] That is, two or more networks 1a-1g constituted the domain, respectively, and arrange the node in each domain on a domain boundary. For example, nodes 100-105 are arranged in domain 1a.
[0050] And there is SPF (Shortest Path First) as an approach of choosing from the source (Source) terminal 200 the shortest root which results in the purpose (Destination) terminal 201, for example. [0051] First, the domain for retrieval is chosen on domain level by SPF, and it marks. In drawing 16 , a domain boundary is [the domains 1a-1d of a continuous line] objects. Next, the arrow (Spoke) linked to the link between the marked domains is marked. It is the arrow (Spoke) of the continuous line in Domains 1a-1d. For example, in domain 1a, they are arrows (Spoke) 110-113. [0052] Subsequently, the optimal root and its cost are calculated by SPF for the arrow (Spoke) which carried out [above-mentioned] the mark to the domain 1d nucleus (Nucleus) 121 which holds the purpose terminal 201 from the nucleus (Nucleus) 120 of domain 1a which holds a source terminal 200. [0053] Furthermore, the total cost is computed by adding the cost to the nucleus 120 of domain 1a which holds a source terminal 200 in the cost for which it asked from a source terminal 200, and the cost to the domain 1d nucleus 121 which holds the purpose terminal 201 from the purpose terminal 201. Thus, the root where the total cost serves as min is chosen.
[0054] Routing processing by this SPF is performed by the connection management section 11 of Nagent1.
[0055] Next, if return explanation was given, after the root will be chosen as drawing 3 , a user 2 is notified of QoS conditions from the network access agent (Nagent) 1 (step S5). This QoS It seems that the contents of the notice of a condition are shown in drawing 7 . As a connection ID, ID (the same value as a resource reservation demand signal is used) for specifying a connection by subsequent signals is notified. Furthermore, offer QoS QoS which provide by carrying out The contents are included.
[0056] A user 2 is QoS. If the notice of a condition is received, a signal will be sent for the notice signal of acceptance to Nagent1 (step S6). The contents are QoS as ID and also acceptance, or refusal of the connection who answers acceptance/refusal as a connection ID as is shown in drawing 8 . QoS told by the notice signal of a condition The reply of whether to communicate on conditions is included.
[0057] Nagent1 is a user 2 to QoS. QoS told by the notice signal of a condition When the reply of the purport which communicates on conditions is received, a resource reservation demand is sent to the network providers 20-22 (step S7).
[0058] It seems that the contents of the resource reservation demand are shown in drawing 9 . As a connection ID, the contents of the port (port) ID by the side of ID for specifying a connection by subsequent signals and the source which requires reservation as a source port (Source Port) ID and the port (Port) ID by the side of the sink which requires reservation as a sink port ID, and QoS further demanded as demand QoS are included.
[0059] Subsequently, a reply signal is returned to Nagent1 from the network providers 20-22. As this reply signal is shown in drawing 10 , the connection ID corresponding to a reply and the reply result of permission / not approving are included as a connection ID.
[0060] And it lets the network provider who has sent the reply result of permission pass, and the communication link of the contents sent from a service provider 23 is performed to a user 2 (step S9).
[0061] Under the present circumstances, the following connection management tables are generated by Nagent1 by the

connection management section 11. Each ID of a demand user besides Connection ID, a server, and a course network provider is registered into a connection management table. Furthermore, QoS Conditions and resource reservation time of day are registered. [0062]

[Table 4]

コネクション管理テーブル

コネクションID	要求ユーザID	サーバID	経由ネットワークプロバイダID	QoS条件	リソース予約時
199901050023	nakamura01	nakamura001	OCN,IIJ,BayNet	1.5M/秒50秒 OCN ¥150/秒 IIJ ¥55/秒 BayNet $1.2/秒	1999年1月5日午前9時35分11秒

[0063] Termination of a communication link sends the notice of communication link termination to Nagent1 from a user 2 (step S10). ID of the connection on whom the contents of this notice of communication link termination end a communication link as a connection ID as shown in drawing 11 is contained.

[0064] If the notice of communication link termination is received, Nagent1 will send a resource release request signal to the provider to whom the network providers 20-22 are equivalent (step S11). As the contents of this resource release request are shown in drawing 12 , ID of the connection who demands resource release as a connection ID is contained.

[0065] If a resource is opened wide, a tariff will be notified from Nagent1 to a user 2 (step S12). As this charge advice is shown in drawing 13 , a tariff is indicated to be ID of the connection corresponding to a charge advice as a connection ID.

[0066] The tariff notified is based on the accounting settlement-of-accounts table 12 (refer to drawing 2) generated by the accounting operation part 12 as shown in degree table. [0067]

[Table 5]

課金・精算テーブル

コネクションID	要求ユーザ	サーバID	経由ネットワークプロバイダID	価格	通信開始、QoS変更、通信終了時刻
1999010 50023	nakamura01	nakamura001	OCN,IIJ,BayNet	1.5M/秒50秒 OCN ¥150・秒 IIJ ¥55/秒 BayNet $1.2/秒	1999年1月5日 午前9時35分11秒

[0068] A user 2 will notify the approach of paying to Nagent1, if a tariff is notified (step S13). The notice of this approach of paying notifies the approach of paying corresponding to the communication link of relevance as a connection ID as ID and approach of paying of the connection corresponding to the notice of an approach to pay, as shown in drawing 14 . For example, the user registers the approach to pay some to Nagent1 beforehand. And the suitable approach of the inside registered by the notice signal of an approach to pay is specified. [0069] Subsequently, Nagent1 notifies the network providers 20-23 of tariff settlement of accounts (step S14). As this notice is shown in drawing 15 , a connection's ID and tariff corresponding to tariff liquidation are shown as a connection ID. In addition, how a network provider pays 20-22 at the time of a contract with Nagent1 is registered.

[0070] Like the above, it carries out and signal transmission and reception are performed between Nagent1, providers 20-22, and a user according to the sequence of drawing 3 .

[0071] Below, the reflection to the accounting settlement of accounts at the time of QoS observation and a failure is explained. The case where a communication link is closed, and a price may be lowered as management in case specified QoS is not actually offered, and a communication link may be continued. [0072] It is desirable for a user to be able to choose these by considering these as management. With QoS guarantee service, since the resource required in order to offer the QoS is secured, when QoS falls by the cause of a certain domain, the network provider who manages an applicable domain needs to fill up the difference of a price to other providers.

[0073] If drawing 17 which shows the settlement-of-accounts approach at the time of QoS observation point and QoS offer improper explains, about analysis of the domain leading to a QoS fall, QoS in an end point (informational dispatch origin and reception place) is always first observed and compared by Nagent1. [0074] And when there is a difference, QoS is observed at the entry of the domain via which it goes, and the domain to which it is falling is looked for. Drawing 17 shows the example which goes via three domains A, B, and C. In this case, although it is Q (x) up to the outlet of Domain A, it is falling to Q (y) at the outlet of Domain B. Thereby, it turns out that it is the cause of a failure that Domain B is the cause.

[0075] For this reason, only the price corresponding to Q (y) instead of QoS quality Q (x) is applicable to a user. The provider who manages Domain B pays the difference. The count approach is shown below.

(1) Consider as the price of original QoS ** 1 SU in the domains A and C leading to a QoS fall. Prices are PA (Q (x)) and PB (Q (y)), respectively. (2) Ask for the total amount of the difference of a price in the domains A and C leading to a QoS fall. The difference sum total is PA(Q (x))-PB (Q (y)). (3) Let the frame which lengthened the difference for which it asked by (2) from the price after a QoS fall be a price in the domain B leading to a QoS fall.

[0076] That is, it is PB(Q (y))-(PA(Q (x))-PA (Q (y)))- (PC(Q (x))-PC (Q (y))). [0077] In order to offer QoSQ (x) demanded in Maine A, B, and C, respectively, in spite of having secured the resource, a certain domain presupposes that the user has been provided only with Q (y) owing to. Therefore, the price corresponding to each QoS sets to P (Q (x)) and P (Q (y)), and a user is asked for P (Q (y)) instead of P (Q (x)).

[0078] It is made to correspond so that the provider to whom P (Q (x)) which should be obtained originally manages the domain B leading to the QoS fall by the difference P(Q (x))-P (Q (y)) by only P (Q (y)) having been obtained may pay.
[0079] The whole network is made to spread here in a general network by exchanging metric one of the border node a domain's, and each other network which a border node (the node of other domains and the node connected directly: also call it an edge node) adjoins. Generally BGP4 (Border Gateway Protocol Version 4) is used as the Border Gateway Protocol.
[0080] in consideration of a network load, as for dynamic information, a load becomes large too much -- it comes out and an exchange is impossible. Nagent1 exchanges fixed information with the domain a contract of is not made by BGP4.
[0081] Drawing 18 is drawing explaining transmission and reception of the constant of Nagent1 and a non-contracting domain. Two or more contract domains 301 exist in the contract domain set field 300. The contract domain 301 is connected through the non-contracting domain 302 and each border node 310 and 311.
[0082] The border node 310 of the domain 301 a contract of is made with Nagent1 transmits the received information to Nagent1. Nagent1 performs metric transmission and reception with the domain 302 which considers that the whole domain a contract of is made is the network of a piece, and has not made a contract of others.
[0083] Consequently, for the domain 302 which has not contracted, the set of the domain 301 which is setting the contract to Nagent1 is visible to one big domain 300.
[0084] In routing, dynamic information is used about the contract domain 301, and Nagent1 uses a constant about the non-contracting domain 302. However, in this case, the constant may differ from the actual value and a block (case where demanded QoS cannot be offered at a shown price) occurs by the root chosen in that case.
[0085] In that case, routing is performed again. When communicating ranging over a non-contracting domain, Nagent1 carries out only routing processing and settlement of accounts when the ability not to offer billing to a user 2, distribution to a provider 22, and promised QoS etc. is not performed.
[0086] In the situation that the non-contracting domain 302 exists, the accounting according to the amount used is difficult, and it cannot perform offering QoS guarantee service as a matter of fact.
[0087] However, as shown in drawing 19 , there is not necessarily no need that Nagent1 is only, Nagent (A) and (B) are installed in every areas A and B, and the gestalt which makes a contract of each domain with Nagent1 of a self area is expected.
[0088] Each Nagent (A) and (B) perform INTARAKUTO mutually, and perform self accounting count and distribution for a contract domain. And Nagent (in drawing 19 , it is Nagent (A).) a contract of is made with the domain in which the subscriber 2 of the side which pays a communication link tariff is held takes charge of the claim of a tariff.
[0089]
[Effect of the Invention] As explained according to the drawing above, reduction of routing computational complexity is achieved by intensive routing according [this invention] to a network access agent (Nagent). Moreover, since it ends by one place compared with performing routing count in each course domain, a connect time is early.
[0090] Furthermore, since the load for the propagation (flooding) to the whole network of domain information is mitigated, also when fluctuating a price frequently, it can apply. Moreover, the combination of settlement of accounts is reduced by U+N from U*N. Here, U is the number of users and N is the number of network providers. [0091] ** is possible further again by carrying out centralized control of the network management functions, such as accounting and routing, by this invention, and reflection to accounting at the time of a failure etc. can be realized easily.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Field of the Invention] This invention relates to centralized charging and the settlement-of-accounts system by the network access agent.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Only offer of the service in which the service provision in the existing Internet does not have the dependability characterized by the best effort type until now is performed.
[0003] On the other hand, research on the implementation method of current QoS (Quality of Service: quality of service) guarantee mold service is advanced. However, examination is seldom progressing about accounting and the clearing system in QoS guarantee mold service.
[0004] It is necessary to respond to a report of a user beforehand, and to reserve and secure a network resource with QoS guarantee mold service. For this reason, the charging system based on the stricter amount used must be applied. If the charging system based on the fixed amount connection or time amount like the existing Internet is applied to QoS guarantee mold service, a user is expected that network use effectiveness gets worse remarkably in order to reserve a lot of possible resources.
[0005] On the other hand, since the incentive which performs capacity strengthening investment is born to the part where it counts upon a lot of use, or a congestion part with the view by the side of a network provider, or the charging system based on the amount used, a charging system based on the amount used is desired even in the field of development and the utilization ratio of the whole network.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] As explained according to the drawing above, reduction of routing computational complexity is achieved by intensive routing according [this invention] to a network access agent (Nagent). Moreover, since it ends by one place compared with performing routing count in each course domain, a connect time is early.
[0090] Furthermore, since the load for the propagation (flooding) to the whole network of domain information is mitigated, also when fluctuating a price frequently, it can apply. Moreover, the combination of settlement of accounts is reduced by U+N from U*N. Here, U is the number of users and N is the number of network providers. [0091] ** is possible further again by carrying out centralized control of the network management functions, such as accounting and routing, by this invention, and reflection to accounting at the time of a failure etc. can be realized easily.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when the network is employed by the single entrepreneur, it is not so difficult, but when it consists of networks which a countless network provider manages like the Internet, the following technical problems occur.
[0007] It is implementation of the approach of determining the root of low cost most among the roots which fill QoS which a user demands [1st]. Especially, scaler kinky thread TIHE needs to be considered. That is, since the network is very large-scale, it is necessary to consider count effectiveness. [0008] It is establishment of the settlement-of-accounts approach at the time of communicating via the network (it being called a domain below) with which two or more network providers provide the 2nd. Payment [each user / many network providers (in it, the provider who has not done the subscription contract is also contained directly)]. Moreover, each network provider needs to receive payment from many users. For this reason, huge settlement-of-accounts office work etc. is needed for authentication.
[0009] Furthermore, when communicating through two or more domains, it is required to establish failure detection when it becomes impossible to offer QoS as which the failure was required by generating in a certain domain, re-routing, and settlement-of-accounts processing.
[0010] Therefore, the purpose of this invention is in service of the type which guarantees QoS to offer centralized charging and the settlement-of-accounts system which fills each above-mentioned demand.

[Translation done.]

MEANS

[Means for Solving the Problem] The above-mentioned technical problem is solved by preparing a network access agent (it being suitably written as Nagent as occasion demands below) by this invention.
[0012] As a desirable gestalt, it has two or more network service providers stationed in each domain, and the service provider connected to a contents provider, and has the network access agent connected to either of said two or more network service providers in the network which provides a user with said contents by demand.
[0013] and the inside of the root which a network access agent registers the quality-of-service (QoS) conditions and price which each domain of two or more of said network service providers offers, and fulfills the quality-of-service (QoS) conditions of a communication link demand receptionist and this communication link demand from said user -- ** -- the cheap root is chosen. [0014] Furthermore, the network service provider which goes via the selected root is notified, and it is characterized by distributing settlement of accounts to the network service provider which used settlement of accounts of the user to activation of said communication link demand on the occasion of activation of a communication link demand. [0015] Furthermore, a desirable gestalt supervises whether the quality of service (QoS) specified further is offered, and when the quality of service (QoS) to offer is less than assignment, it analyzes the domain used as the cause. And it is characterized by making the network provider who manages the domain of relevance by the difference of an income fill up. [0016] Moreover, a desirable gestalt is characterized by performing selection of said root using a Nucl eus&Spoke (nucleus and arrow) model.
[0017] A quality of service (QoS) is measured at the outlet of the domain via which it goes when a monitor observes a quality of service (QoS), respectively and has [whether said specified quality of service (QoS) is offered as a desirable gestalt further again, and] a difference among said selected service providers and users, and it is characterized by pinpointing the domain used as a cause. [0018] The further description of this invention becomes clear from the gestalt of implementation of invention explained with reference to the following drawings.
[0019]
[Embodiment of the Invention] The gestalt of operation of this invention is explained with reference to a drawing below. In addition, in drawing, a reference number or a reference designator identically same to a like is attached and explained.
[0020] Drawing 1 is drawing showing the network configuration and the business model of the system which realizes centralized charging and the settlement-of-accounts approach by the network access agent (Nagent) who applies this invention.
[0021] Two or more network providers 20-22 exist in a network, and connection between networks is made. Furthermore, a service provider 23 exists and the contents from the contents provider 3 are sent out towards the user 2 with a demand.
[0022] As a description of this invention, the network access agent (Nagent) 1 linked to one of network providers is installed. It connects with the network provider 20 in drawing 1 .
[0023] This Nagent1 has the function to perform the resource management between domains, routing, accounting and settlement of accounts, fault management, etc. This function is realized by the software configuration of Nagent1 as shown in drawing 2 .
[0024] Software constitutes each function part of the routing section 10, the connection management section 11, and the accounting settlement-of-accounts section 12. The routing section 10 carries out generation registration of the user registration table, network provider registration table, and service provider registration table which are explained later.
[0025] The connection management section 11 performs the resource reservation demand and disconnection to said network service provider corresponding to a receptionist and this quality service (QoS) demand of the quality service (QoS) demand from a user.
[0026] The accounting liquidation section 12 has the table which performs accounting liquidation based on the communication link initiation from the connection management section 11, and the notice of termination.
[0027] Furthermore, although the detail of actuation of each function part is explained later, it explains the outline of this invention by drawing 1 here for easy-izing of an understanding.
[0028] In drawing 1, each network providers 20-22 register into Nagent1 the QoS conditions and price which a self-domain offers.
[0029] the inside of the root which fulfills the QoS conditions of the communication link demand which received Nagent1 from the user 2 -- ** -- the cheap root is chosen and the going provider is notified of it.
[0030] About settlement of accounts, a user 2 pays a tariff to Nagent1. And settlement of accounts is distributed to the provider who used it by Nagent1.
[0031] Nagent1 supervises whether specified QoS is offered further. When QoS to offer is less than assignment, the domain used as the cause is analyzed. And the provider who manages the domain of relevance by the difference of an income is made to fill up.
[0032] The concrete example of the centralized charging and the settlement-of-accounts approach by the network access agent (Nagent) 1 according to above-mentioned this invention is explained according to the Nagent-provider-user-user signaling sequence flow of drawing 3 .
[0033] Moreover, the contents of the signal sent and received according to the sequence flow of drawing 3 are shown in

drawing 4 thru/or drawing 15 . The sequence of drawing 3 is explained referring to these drawings suitably.
[0034] A QoS condition registration signal is sent to the network access agent (Nagent) 1 in advance from the network providers 20-22 (step S1). It seems that the contents of this QoS condition registration signal are shown in drawing 4 . Namely, a network provider's port ID or (Port) Target PortID or target BypassID is sent as a bypass (Bypass) ID.
[0035] Furthermore, when it has connected with the port as an initial entry when an object is a port (Port), and also a provider's Port (Port) ID and object are a bypass (Bypass), the port (Port) ID of the self-domain which the bypass has connected is sent. [0036] Moreover, it is QoS between the ports connected when QoS (a price, a band, the maximum delay, etc.) between Nucleus(es) (nucleus) later explained to be the port when an object is a port (Port) as QoS conditions, and an object are bypasses. It is sent.
[0037] Thereby, the network access agent (Nagent) 1 registers the following network provider registration table in the routing section 10 (refer to drawing 2).
[0038]
[Table 1]

ネットワークプロバイダ登録テーブル

Network Provder ID	Port ID	QoS条件	支払い条件
OCN	東京01	6M/秒 20m秒 ¥300/分	銀行振込
		1.5M/秒 20m秒 ¥100/分	XX銀行
	横浜01	6M/秒 18m秒 ¥360/分	

[0039] Similarly, a service condition registration signal is sent to the network access agent (Nagent) 1 in advance from a service provider 23 (step S2). It seems that the contents of this service condition registration signal are shown in drawing 5 . That is, ID of a self-server is sent as a server (server) ID of a service provider.
[0040] Furthermore, a provider's PortID which a self-server connects is sent as a port (port) ID. Moreover, applicable service recommendation or the QoS conditions to permit are sent as QoS conditions.
[0041] This registers the following service provider registration table by the network access agent's (Nagent) 1 routing section 10.
[0042]
[Table 2]

サービスプロバイダ登録テーブル

サーバID	接続するプロバイダのPort ID	推奨するQoS条件
nakara001	muOCN 東京 07	推奨 6.3M/秒 最低1.5M/秒

[0043] Moreover, when there is a QoS demand from a user (step S3), user registration is beforehand performed to the network access agent (Nagent) 1. The following user registration table is created by the routing section 10 based on the information from a user 2 sent through the network access agent's (Nagent) 1 connection management section 11 as this user registration.
[0044]
[Table 3]

ユーザ登録テーブル

ユーザID	接続するプロバイダのPort ID	ユーザの端末または加入者線で許容されるQoS条件(帯域等)	支払い条件
nakamura 001	Nifty 川崎 01	1. 5M/秒	VISA0123456

[0045] Thus, a user registration table, a network provider registration table, and a service provider registration table are registered into Nagent1.
[0046] In these conditions, the demand of QoS is sent to Nagent1 from a user 2 (step S3). It seems that the contents of the demand of QoS sent by the user 2 are shown in drawing 6 here. [0047] Namely, the user ID assigned at the time of Nagent1 and a contract (However, the user who has not contracted with Nagent1 is omitted) A provider's PortID which self connects (however, abbreviated to specifying user ID), QoS permitted with a user's terminal or subscriber line The subscriber conditions of conditions (band etc.) (abbreviated to specifying user ID), ID of the server which wants to communicate, and QoS which applicable service recommends or permits They are conditions (QoS assignment of Guarantee (indispensable) and Best Effort (if possible) is possible for every item). [0048] The network access agent (Nagent) 1 will choose the root, if the demand of QoS is sent from a user 2. The selection algorithm of this root is explained by Nucleus(nucleus) &Spoke (arrow) model routing shown in drawing 16 .
[0049] That is, two or more networks 1a-1g constituted the domain, respectively, and arrange the node in each domain on a domain boundary. For example, nodes 100-105 are arranged in domain 1a.

[0050] And there is SPF (Shortest Path First) as an approach of choosing from the source (Source) terminal 200 the shortest root which results in the purpose (Destination) terminal 201, for example. [0051] First, the domain for retrieval is chosen on domain level by SPF, and it marks. In drawing 16 , a domain boundary is [the domains 1a-1d of a continuous line] objects. Next, the arrow (Spoke) linked to the link between the marked domains is marked. It is the arrow (Spoke) of the continuous line in Domains 1a-1d. For example, in domain 1a, they are arrows (Spoke) 110-113. [0052] Subsequently, the optimal root and its cost are calculated by SPF for the arrow (Spoke) which carried out [above-mentioned] the mark to the domain 1d nucleus (Nucleus) 121 which holds the purpose terminal 201 from the nucleus (Nucleus) 120 of domain 1a which holds a source terminal 200. [0053] Furthermore, the total cost is computed by adding the cost to the nucleus 120 of domain 1a which holds a source terminal 200 in the cost for which it asked from a source terminal 200, and the cost to the domain 1d nucleus 121 which holds the purpose terminal 201 from the purpose terminal 201. Thus, the root where the total cost serves as min is chosen.
[0054] Routing processing by this SPF is performed by the connection management section 11 of Nagent1.
[0055] Next, if return explanation was given, after the root will be chosen as drawing 3 , a user 2 is notified of QoS conditions from the network access agent (Nagent) 1 (step S5). This QoS It seems that the contents of the notice of a condition are shown in drawing 7 . As a connection ID, ID (the same value as a resource reservation demand signal is used) for specifying a connection by subsequent signals is notified. Furthermore, offer QoS QoS which provide by carrying out The contents are included.
[0056] A user 2 is QoS. If the notice of a condition is received, a signal will be sent for the notice signal of acceptance to Nagent1 (step S6). The contents are QoS as ID and also acceptance, or refusal of the connection who answers acceptance/refusal as a connection ID as is shown in drawing 8 . QoS told by the notice signal of a condition The reply of whether to communicate on conditions is included.
[0057] Nagent1 is a user 2 to QoS. QoS told by the notice signal of a condition When the reply of the purport which communicates on conditions is received, a resource reservation demand is sent to the network providers 20-22 (step S7).
[0058] It seems that the contents of the resource reservation demand are shown in drawing 9 . As a connection ID, the contents of the port (port) ID by the side of ID for specifying a connection by subsequent signals and the source which requires reservation as a source port (Source Port) ID and the port (Port) ID by the side of the sink which requires reservation as a sink port ID, and QoS further demanded as demand QoS are included.
[0059] Subsequently, a reply signal is returned to Nagent1 from the network providers 20-22. As this reply signal is shown in drawing 10 , the connection ID corresponding to a reply and the reply result of permission / not approving are included as a connection ID.
[0060] And it lets the network provider who has sent the reply result of permission pass, and the communication link of the contents sent from a service provider 23 is performed to a user 2 (step S9).
[0061] Under the present circumstances, the following connection management tables are generated by Nagent1 by the connection management section 11. Each ID of a demand user besides Connection ID, a server, and a course network provider is registered into a connection management table. Furthermore, QoS Conditions and resource reservation time of day are registered. [0062]
[Table 4]

コネクション管理テーブル

コネクションID	要求ユーザID	サーバID	経由ネットワークプロバイダID	QoS条件	リソース予約時
199901050023	nakamura01	nakamura001	OCN,IIJ,BayNet	1.5M/秒50秒 OCN ¥150/秒 IIJ ¥55/秒 BayNet $1.2/秒	1999年1月5日午前9時35分11秒

[0063] Termination of a communication link sends the notice of communication link termination to Nagent1 from a user 2 (step S10). ID of the connection on whom the contents of this notice of communication link termination end a communication link as a connection ID as shown in drawing 11 is contained.
[0064] If the notice of communication link termination is received, Nagent1 will send a resource release request signal to the provider to whom the network providers 20-22 are equivalent (step S11). As the contents of this resource release request are shown in drawing 12 , ID of the connection who demands resource release as a connection ID is contained.
[0065] If a resource is opened wide, a tariff will be notified from Nagent1 to a user 2 (step S12). As this charge advice is shown in drawing 13 , a tariff is indicated to be ID of the connection corresponding to a charge advice as a connection ID.
[0066] The tariff notified is based on the accounting settlement-of-accounts table 12 (refer to drawing 2) generated by the accounting operation part 12 as shown in degree table. [0067]
[Table 5]

課金・精算テーブル

コネクションＩＤ	要求ユーザ	サーバＩＤ	経由ネットワーク プロバイダＩＤ	価格	通信開始、QoS変更、通信終了時刻
1999010 50023	nakamura01	nakamura001	OCN,IIJ,BayNet	1.5M/秒50秒 OCN ¥150・秒 IIJ ¥55/秒 BayNet $1.2/秒	1999年1月5日 午前9時35分11秒

[0068] A user 2 will notify the approach of paying to Nagent1, if a tariff is notified (step S13). The notice of this approach of paying notifies the approach of paying corresponding to the communication link of relevance as a connection ID as ID and approach of paying of the connection corresponding to the notice of an approach to pay, as shown in drawing 14 . For example, the user registers the approach to pay some to Nagent1 beforehand. And the suitable approach of the inside registered by the notice signal of an approach to pay is specified. [0069] Subsequently, Nagent1 notifies the network providers 20-23 of tariff settlement of accounts (step S14). As this notice is shown in drawing 15 , a connection's ID and tariff corresponding to tariff liquidation are shown as a connection ID. In addition, how a network provider pays 20-22 at the time of a contract with Nagent1 is registered.
[0070] Like the above, it carries out and signal transmission and reception are performed between Nagent1, providers 20-22, and a user according to the sequence of drawing 3 .
[0071] Below, the reflection to the accounting settlement of accounts at the time of QoS observation and a failure is explained. The case where a communication link is closed, and a price may be lowered as management in case specified QoS is not actually offered, and a communication link may be continued. [0072] It is desirable for a user to be able to choose these by considering these as management. With QoS guarantee service, since the resource required in order to offer the QoS is secured, when QoS falls by the cause of a certain domain, the network provider who manages an applicable domain needs to fill up the difference of a price to other providers.
[0073] If drawing 17 which shows the settlement-of-accounts approach at the time of QoS observation point and QoS offer improper explains, about analysis of the domain leading to a QoS fall, QoS in an end point (informational dispatch origin and reception place) is always first observed and compared by Nagent1. [0074] And when there is a difference, QoS is observed at the entry of the domain via which it goes, and the domain to which it is falling is looked for. Drawing 17 shows the example which goes via three domains A, B, and C. In this case, although it is Q (x) up to the outlet of Domain A, it is falling to Q (y) at the outlet of Domain B. Thereby, it turns out that it is the cause of a failure that Domain B is the cause.
[0075] For this reason, only the price corresponding to Q (y) instead of QoS quality Q (x) is applicable to a user. The provider who manages Domain B pays the difference. The count approach is shown below.
(1) Consider as the price of original QoS ** 1 SU in the domains A and C leading to a QoS fall. Prices are PA (Q (x)) and PB (Q (y)), respectively. (2) Ask for the total amount of the difference of a price in the domains A and C leading to a QoS fall. The difference sum total is PA(Q (x))-PB (Q (y)). (3) Let the frame which lengthened the difference for which it asked by (2) from the price after a QoS fall be a price in the domain B leading to a QoS fall.
[0076] That is, it is PB(Q (y))-(PA(Q (x))-PA (Q (y)))- (PC(Q (x))-PC (Q (y))). [0077] In order to offer QoSQ (x) demanded in Maine A, B, and C, respectively, in spite of having secured the resource, a certain domain presupposes that the user has been provided only with Q (y) owing to. Therefore, the price corresponding to each QoS sets to P (Q (x)) and P (Q (y)), and a user is asked for P (Q (y)) instead of P (Q (x)).
[0078] It is made to correspond so that the provider to whom P (Q (x)) which should be obtained originally manages the domain B leading to the QoS fall by the difference P(Q (x))-P (Q (y)) by only P (Q (y)) having been obtained may pay.
[0079] The whole network is made to spread here in a general network by exchanging metric one of the border node a domain's, and each other network which a border node (the node of other domains and the node connected directly: also call it an edge node) adjoins. Generally BGP4 (Border Gateway Protocol Version 4) is used as the Border Gateway Protocol.
[0080] In consideration of a network load, as for dynamic information, a load becomes large too much -- it comes out and an exchange is impossible. Nagent1 exchanges fixed information with the domain a contract of is not made by BGP4.
[0081] Drawing 18 is drawing explaining transmission and reception of the constant of Nagent1 and a non-contracting domain. Two or more contract domains 301 exist in the contract domain set field 300. The contract domain 301 is connected through the non-contracting domain 302 and each border node 310 and 311.
[0082] The border node 310 of the domain 301 a contract of is made with Nagent1 transmits the received information to Nagent1. Nagent1 performs metric transmission and reception with the domain 302 which considers that the whole domain a contract of is made is the network of a piece, and has not made a contract of others.
[0083] Consequently, for the domain 302 which has not contracted, the set of the domain 301 which is setting the contract to Nagent1 is visible to one big domain 300.
[0084] In routing, dynamic information is used about the contract domain 301, and Nagent1 uses a constant about the non-contracting domain 302. However, in this case, the constant may differ from the actual value and a block (case where demanded QoS cannot be offered at a shown price) occurs by the root chosen in that case.
[0085] In that case, routing is performed again. When communicating ranging over a non-contracting domain, Nagent1 carries out only routing processing and settlement of accounts when the ability not to offer billing to a user 2, distribution to a provider 22, and promised QoS etc. is not performed.
[0086] In the situation that the non-contracting domain 302 exists, the accounting according to the amount used is difficult, and it cannot perform offering QoS guarantee service as a matter of fact.
[0087] However, as shown in drawing 19 , there is not necessarily no need that Nagent1 is only, Nagent (A) and (B) are installed in every areas A and B, and the gestalt which makes a contract of each domain with Nagent1 of a self area is expected.
[0088] Each Nagent (A) and (B) perform INTARAKUTO mutually, and perform self accounting count and distribution for a contract domain. And Nagent (in drawing 19 , it is Nagent (A).) a contract of is made with the domain in which the subscriber 2 of the side which pays a communication link tariff is held takes charge of the claim of a tariff.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the network configuration and the business model of the system which realizes centralized charging and the settlement-of-accounts approach by the network access agent (Nagent) who applies this invention.
[Drawing 2] It is drawing explaining the function of Nagent1 which performs the resource management between domains, routing, accounting and settlement of accounts, fault management, etc.
[Drawing 3] It is drawing showing a Nagent-provider-user-user signaling sequence flow.
[Drawing 4] It is drawing showing the contents of the QoS condition registration signal sent and received according to the sequence flow of drawing 3 .
[Drawing 5] It is drawing showing the contents of the service condition registration signal sent and received according to the sequence flow of drawing 3 .
[Drawing 6] It is drawing showing the contents of the QoS demand signal sent and received according to the sequence flow of drawing 3 .
[Drawing 7] It is drawing showing the contents of the notice signal of a QoS condition sent and received according to the sequence flow of drawing 3 .
[Drawing 8] It is drawing showing the contents of the notice signal of QoS acceptance sent and received according to the sequence flow of drawing 3 .
[Drawing 9] It is drawing showing the contents of the resource reservation demand signal sent and received according to the sequence flow of drawing 3 .
[Drawing 10] It is drawing showing the contents of the reply signal sent and received according to the sequence flow of drawing 3 .
[Drawing 11] It is drawing showing the contents of the communication link terminate signal sent and received according to the sequence flow of drawing 3 .
[Drawing 12] It is drawing showing the contents of the resource disconnection signal sent and received according to the sequence flow of drawing 3 .
[Drawing 13] It is drawing showing the contents of the charge-advice signal sent and received according to the sequence flow of drawing 3 .
[Drawing 14] It is drawing showing the contents of the notice signal of an approach which is sent and received according to the sequence flow of drawing 3 , and to pay.
[Drawing 15] It is drawing showing the contents of the notice signal of tariff settlement of accounts sent and received according to the sequence flow of drawing 3 .
[Drawing 16] It is drawing explaining routing by the nucleus (Nucleus) and the arrow (spoke) model.
[Drawing 17] It is drawing showing the settlement-of-accounts approach at the time of QoS observation point and QoS offer improper.
[Drawing 18] It is drawing explaining transmission and reception of the constant of Nagent and a non-contracting domain.
[Drawing 19] It is drawing explaining two or more accounting settlement of accounts by INTARAKUTO of Nagent.
[Description of Notations]
1 Network Access Agent
2 User
3 Contents Provider
20-23 Network service provider
10 Routing Section
11 Connection Management Section
12 Accounting Settlement-of-Accounts Section

[Translation done.]